

**Unlocking Potential Woman-Headed Family (PEKKA) in Indonesia:
Innovation in Technology-Based Entrepreneurship Education
Through Digital Literacy and Knowledge Management**

Kheyene Molekandella Boer, Mulawarman University, Indonesia
Poppy Alvianolita Sanistasya, Mulawarman University, Indonesia
Annisa Wahyuni Arsyad, Mulawarman University, Indonesia
Rosyid Nurrohman, Mulawarman University, Indonesia
Umami Nadroh, Mulawarman University, Indonesia
Adinda Dyah Pitaloka, Mulawarman University, Indonesia

The Southeast Asian Conference on Education 2025
Official Conference Proceedings

Abstract

The emergence of digital literacy capability in the disruptive era 4.0 is one of the most influential sectors to deal with women headed-family (PEKKA) in Indonesia's new capital city. As the digital landscape evolves rapidly, entrepreneurs must adapt by embracing innovation and growth through technology. Empowering womenpreneurs requires addressing digital barriers and enhancing learning experiences through digital literacy and effective knowledge management. This study explores how agile methodology and knowledge exploitation can support small and medium enterprises (SMEs) in acquiring and utilizing relevant knowledge to meet evolving business needs. It also addresses a gap in entrepreneurial education by analyzing the willingness of individuals and organizations to create, share, and apply knowledge within a digital, innovative, and flexible learning environment. Using a quantitative research approach, the study involved 150 PEKKA participants selected through purposive sampling. Structural Equation Modeling using Partial Least Squares (SEM-PLS) was applied to examine the relationships among variables. Findings indicate that technology-driven entrepreneurial education positively impacts womenpreneurs, highlighting meaningful interactions between digital literacy and knowledge management. The study also reveals that women with a preference for active experimentation tend to develop entrepreneurial skills more effectively. However, these skills can also be nurtured through targeted education, coaching, and hands-on practice. This research contributes original insights by proposing a digital literacy framework tailored to the unique needs of PEKKA—a group often marginalized in digital access. It offers practical training strategies and integrates innovation diffusion theory with a resource-based view to address digital skill gaps and resistance to innovation effectively.

Keywords: digital literacy, knowledge management, technology innovation

iafor

The International Academic Forum
www.iafor.org

Introduction

Women's empowerment in the digital economy sector has far-reaching implications for enhancing their competitiveness and overall well-being. Programs focused on women's empowerment, particularly in digitalization and micro, small, and medium enterprises (MSMEs), align with the Sustainable Development Goals (SDGs) and the Three Economic Engines Strategy (Portal Informasi Indonesia, 2024). These initiatives particularly support inclusive quality education, including digital skills (SDG 4), reducing inequalities (SDG 10), promoting gender equality (SDG 5), and fostering decent work and economic growth (SDG 8). Women's entrepreneurship empowerment, facilitated by technology, plays a crucial role in overcoming various potential barriers and fostering innovative learning processes that incorporate digital literacy and knowledge management. Strengthening women's participation in the digital economy sector enhances their entrepreneurial competitiveness (Capel et al., 2017; Dharmayanti et al., 2022), ultimately contributing to their overall well-being.

Digital literacy skills in the Industry 4.0 era have become a critical issue for economic empowerment, particularly among women in Indonesia (Susiana, 2024). These skills encompass the ability to operate digital tools and platforms, as well as an understanding of data security, digital ethics, and business analytics. Meanwhile, digital entrepreneurship refers to leveraging technology in managing and expanding business ventures (Asgharnehad & Haghdoust, 2022; Meungwe, 2025). Furthermore, knowledge management plays a vital role in supporting the administration and growth of technology-driven businesses. According to Ghufon and Mardiana (2020), the synergy between digital literacy and knowledge management creates new opportunities in the Industry 4.0 era, enabling strategic information management that contributes to both individual and organizational competitive advantage. Research by Xia and Jiaqi (2024) highlights that digital literacy in leadership directly influences green technological innovation within companies. Additionally, the effectiveness of knowledge management is a key factor in product and service development (du Plessis, 2007; Lai & Lin, 2012), significantly contributing to organizational innovation (Alegre et al., 2013; Mardani et al., 2018). Without adequate digital literacy and knowledge management skills, women will face significant challenges in competing and thriving in the modern digital economy.

According to the Center for Indonesian Policy Studies, women constitute 21% of entrepreneurs in Indonesia, a figure significantly higher than the global average of 8% (Anjani, 2021). In 2018, Bank Indonesia reported that the total number of MSMEs in Indonesia reached 57.83 million, with more than 60%—approximately 37 million enterprises—managed by women. However, an OECD report indicates that women-owned MSMEs tend to be less oriented toward high growth and large-scale job creation. On average, female-led businesses only begin to provide employment opportunities for others after at least five years of operation (PRAKARSA, 2020).

In the report by PRAKARSA (2020), women entrepreneurs, particularly those classified as Female-Headed Households (PEKKA), encounter significant challenges in expanding their businesses due to time constraints related to domestic responsibilities. Statistics from Central Bureau of Statistics (BPS) reveal that 12.72% of Indonesian households are headed by women (Paramitha, 2023), with Samarinda recording a higher figure at 19.96% (Secretariat of the Samarinda City Government, 2024). Women who simultaneously manage households and businesses to support their families are commonly referred to as “Mompreneurs” (Landor, 2020). For PEKKA, these challenges are even more complex, as their businesses

serve not as supplementary income but as the primary means of financial support (PRAKARSA, 2020). Many assume the role of sole breadwinners due to divorce, the loss of a spouse, or a partner's inability to work (Asih, 2024). Key barriers they face include limited access to technology, entrepreneurial education, business opportunities, and financial resources (East Kalimantan Provincial Office of Communication and Information Technology, n.d.). Low digital literacy makes women, particularly PEKKA, more vulnerable to digital threats such as online fraud and illegal digital lending schemes (IDN Times, 2023). Consequently, many PEKKA struggle to sustain and grow their businesses due to a lack of opportunities to enhance their skills and adapt to digital technology (North Kalimantan Provincial Government, 2022).

In various regions of Indonesia, particularly in rural areas, there is a notable phenomenon where the proportion of women serving as heads of households exceeds that of men. According to data from the Central Bureau of Statistics (2024) in 2023, Papua and West Papua recorded the highest percentages in this category. Papua reported 91.1% of female-headed households, making it the region with the highest proportion, followed by West Papua at 83%. Additionally, Bali, a globally recognized tourist destination, also exhibited a significant figure, with 79% of households led by women. In other regions, such as East Nusa Tenggara (NTT) and North Sumatra, the percentages reached 77% and 76%, respectively. This phenomenon reflects complex socio-economic dynamics, including male labor migration, shifts in family structures, and the influence of cultural and social policies that contribute to the increasing number of female-headed households.

Despite various empowerment efforts, challenges faced by PEKKA still require attention and support from multiple stakeholders. The East Kalimantan government has introduced several initiatives, including soft skills training programs for female MSME entrepreneurs (Samarinda Municipal Department of Women Empowerment and Child Protection, 2024), aimed at enhancing their business competencies. However, disparities in access to resources and economic opportunities remain an issue (East Kalimantan Provincial Office of Communication and Information Technology, n.d.). In the context of entrepreneurship education, integrating digital literacy serves as an effective strategy for equipping women with industry-relevant digital skills. Technology-based entrepreneurship education not only enhances academic knowledge but also develops practical skills essential for establishing and managing digital businesses (Boocock et al., 2009). Silamut and Petsangsri (2020) emphasize that integrating digital tools into learning enhances women's ability to access and manage information effectively, ultimately accelerating innovation in digital business.

To address the challenges of low digital literacy and resistance to new innovations, accessible and contextually relevant training programs are essential. Technology-driven educational models emphasizing experiential learning such as business simulations and digital startup incubators can provide PEKKA with valuable hands-on experience (Ghufron & Mardiana, 2020). With the right strategies, digital literacy and entrepreneurship education can serve as powerful tools for empowering women, strengthening their business competencies, and fostering a more inclusive digital economy. Previous studies have also underscored the importance of entrepreneurship training tailored to local natural resources to enhance women's skills and knowledge in job creation and economic well-being (Karwati, 2017). Additionally, research by Arbarini et al. (2023) highlights the critical role of digital literacy training in empowering rural women. Such initiatives enable women to drive economic progress through simple yet impactful actions, such as leveraging social media for product promotion, ultimately improving their financial well-being.

This study holds original value in redesigning a digital literacy framework specifically tailored to the needs of *Perempuan Kepala Keluarga* (PEKKA) in Indonesia, a group that often faces limited access to technology. By integrating a comprehensive approach that combines digital literacy and knowledge management in entrepreneurship education, this research not only offers practical solutions for enhancing digital skills but also provides a unique theoretical contribution by merging the Diffusion of Innovation (DOI) theory (Rogers, 2003) with the Resource-Based View (RBV) approach (Barney, 1991). The DOI theory explains how new ideas and technologies spread within societies, while the RBV approach emphasizes the importance of valuable, rare, inimitable, and non-substitutable (VRIN) resources in achieving a competitive advantage. The key added value of this study lies in its ability to address the challenges of low digital literacy and resistance to new innovations through an accessible and relevant training model, while simultaneously ensuring inclusivity and sustainability in Indonesia's digital economy development.

Literature Review

Diffusion of Innovation (DOI) Theory

The Diffusion of Innovation (DOI) theory, introduced by Everett Rogers (2003), explains how new ideas, technologies, and practices spread within a society or organization over time. According to Rogers, the adoption process occurs through five key stages: knowledge, persuasion, decision, implementation, and confirmation. The theory categorizes adopters into five groups based on their willingness to embrace innovation:

1. Innovators (2.5%) are risk-takers and the first to adopt new technologies.
2. Early Adopters (13.5%) are influential opinion leaders who guide and inspire others to follow.
3. The Early Majority (34%) are practical individuals who adopt innovations ahead of the average person.
4. The Late Majority (34%) are cautious and skeptical, adopting only after an innovation becomes widely accepted.
5. Laggards (16%) are resistant to change, adopting new ideas only when necessary or unavoidable.

In the context of digital literacy and entrepreneurship among PEKKA (Perempuan Kepala Keluarga), the DOI theory helps explain why some individuals quickly adopt digital tools while others face challenges due to limited knowledge, trust issues, or access to resources. Understanding this diffusion process enables the development of targeted strategies to accelerate digital adoption among female entrepreneurs.

Resource-Based View (RBV) Approach

The Resource-Based View (RBV) approach, developed by Jay Barney (1991), focuses on how an organization's internal resources and capabilities create a sustainable competitive advantage. According to RBV, a resource must meet the VRIN criteria to be a source of competitive advantage:

1. Valuable means it can help improve efficiency and effectiveness.
2. Rare means it is not widely available to competitors.
3. Inimitable means it is difficult to replicate or substitute.
4. Non-substitutable means there is no equivalent alternative.

Applying RBV to digital entrepreneurship, female entrepreneurs who develop strong digital literacy skills and effective knowledge management strategies gain a competitive edge. Their ability to leverage digital platforms, utilize technology for business efficiency, and create unique value propositions aligns with RBV principles, enabling long-term sustainability in the digital economy.

Digital Literacy

Digital literacy refers to an individual's ability to effectively navigate, comprehend, and utilize digital technologies for various purposes, including communication, content creation, and information management (Musa, 2024). It consists of several key dimensions:

1. Photo-visual literacy
The ability to interpret and derive meaning from visual digital representations, enhancing comprehension of multimedia content (Musa, 2024).
2. Reproduction literacy
The skill to create, modify, and disseminate digital content ethically and effectively, enabling innovation in digital communication (Ghufron & Mardiana, 2020).
3. Branching literacy
The competence to navigate and synthesize non-linear digital information structures, such as hyperlinks and interconnected content, fostering adaptive learning (Jasin et al., 2024).
4. Socio-emotional literacy
The capability to engage responsibly in digital environments, ensuring ethical online communication, digital well-being, and awareness of cyber risks (Ghufron & Mardiana, 2020).
5. Information literacy
The ability to locate, evaluate, and utilize digital information efficiently, ensuring critical thinking and informed decision-making (Musa, 2024).

Integrating these dimensions is essential for improving digital empowerment, particularly among women-headed households (PEKKA) in Indonesia, supporting their entrepreneurial and socio-economic advancement.

Knowledge Management

Knowledge management refers to the systematic process of creating, sharing, and applying knowledge to enhance organizational or individual capabilities (Musa, 2024). It consists of three key dimensions:

1. Knowledge creation
The development of new ideas, insights, and solutions through interaction, learning, and innovation in digital environments (Musa, 2024).
2. Knowledge sharing
The exchange of knowledge among individuals or groups to improve collective understanding and problem-solving capabilities (Jasin et al., 2024).
3. Knowledge application
The effective utilization of acquired knowledge to enhance decision-making, productivity, and innovation in various domains (Jasin et al., 2024).

A strong knowledge management framework is crucial in fostering digital literacy and entrepreneurship, particularly for women-headed households (PEKKA), enabling sustainable economic empowerment.

Technology Innovation

Technology innovation refers to the development and implementation of new or improved technological solutions to enhance efficiency, competitiveness, and adaptability (Ghufron & Mardiana, 2020). It comprises three key dimensions:

1. Product innovation
The creation or enhancement of products with new features, improved performance, or better user experience to meet market demands (Jasin et al., 2024).
2. Process innovation
The optimization of operational workflows and production methods through technology-driven advancements to improve efficiency and reduce costs (Ghufron & Mardiana, 2020).
3. Technological integration
The seamless incorporation of digital tools, automation, and smart technologies into business processes to enhance productivity and decision-making (Jasin et al., 2024).

Effective technology innovation is essential for digital transformation, particularly in entrepreneurship and knowledge-driven economies.

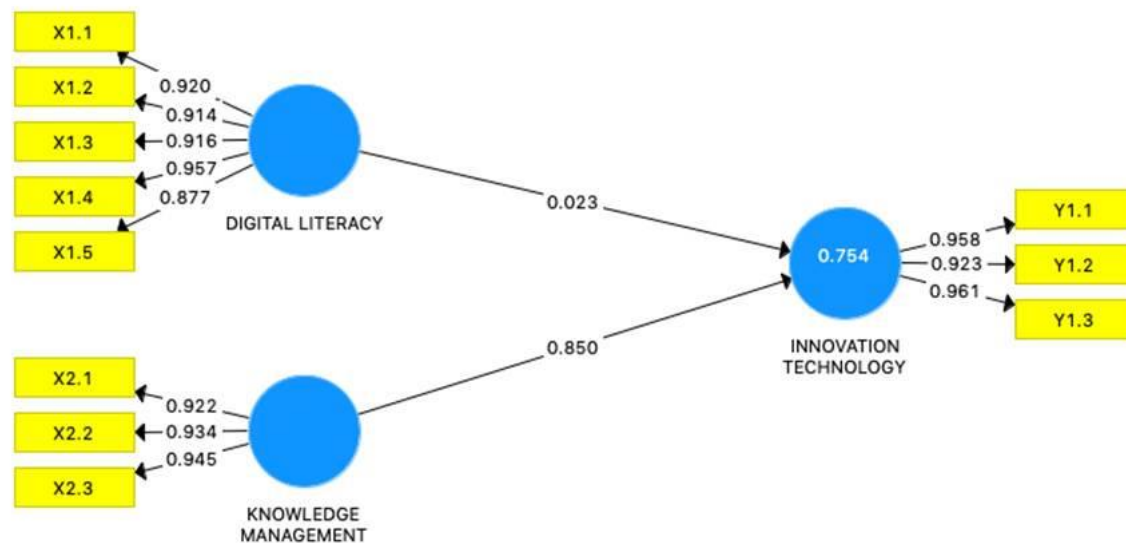
Method

This study employs a quantitative approach with a survey method to analyze the factors influencing the role of *Women-Headed Families* (PEKKA) in East Kalimantan within a socio-economic framework. The research population consists of 150 PEKKA in East Kalimantan. Following the guidelines of Kerlinger and Lee (2000), which state that a minimum of 30 respondents is required for quantitative research, this study selects 33 respondents, ensuring compliance with the recommended sample size. A purposive sampling technique was utilized, as only respondents meeting specific criteria and willing to participate were included. Data collection was conducted through structured questionnaires and analyzed using *SmartPLS 4.0*, a method suitable for examining relationships between latent variables, even with relatively small sample sizes.

Result, Discussion, and Conclusion

A quantitative method approach was employed to explore innovation in technology-based entrepreneurship education through digital literacy and knowledge management within PEKKA. SEM-PLS analysis was conducted to evaluate the relationships between latent variables and their supporting indicators. PLS is known to be effective in handling models with complex data, small samples, and predictive relationship testing. The following figure presents the results of the structural model and measurement mapping, illustrating the strength of relationships among Digital Literacy, Knowledge Management, and Innovation Technology, as well as the contribution of each indicator in constructing the research model.

Figure 1: PLS Algorithm of Model Hubungan Digital Literacy, Knowledge Management, Dan Innovation Technology



Based on the analysis results, Digital Literacy is measured through five indicators (X1.1 to X1.5) with loading factors ranging from 0.877 to 0.957, indicating that all indicators strongly contribute to this construct. Meanwhile, Knowledge Management is measured with three indicators (X2.1 to X2.3), showing very high loading factors between 0.922 and 0.945, signifying that this variable is well-represented by its indicators.

As a dependent variable, Innovation Technology has three indicators (Y1.1 to Y1.3), with excellent loading factors ranging from 0.923 to 0.961, reinforcing that this construct is measured strongly and validly. The relationship between Digital Literacy and Innovation Technology produces a coefficient of 0.023, indicating a very small or even nearly insignificant effect. On the other hand, Knowledge Management shows a much stronger influence on Innovation Technology with a path coefficient of 0.850, emphasizing that knowledge management plays a crucial role in driving technological innovation.

Overall, this model demonstrates that while Digital Literacy remains essential, Knowledge Management contributes more significantly to fostering technological innovation. This study can serve as a foundation for designing training programs that focus more on strengthening knowledge management, alongside efforts to improve digital literacy for entrepreneurs.

Based on the results of the Outer Loadings analysis, all indicators demonstrate excellent values in measuring their respective constructs. In Partial Least Squares Structural Equation Modeling (PLS-SEM), outer loadings are used to assess the extent to which each indicator represents its construct. According to Hair et al. (2021) and Sarstedt et al. (2022), the recommended threshold for outer loadings is ≥ 0.708 , as this value ensures that an indicator explains at least 50% of the variance in its construct.

Table 1: Outer Loadings

	Outer Loadings
X1.1	0.92
X1.2	0.914
X1.3	0.916
X1.4	0.957
X1.5	0.877
X2.1	0.922
X2.2	0.934
X2.3	0.945
Y1.1	0.958
Y1.2	0.923
Y1.3	0.961

In this study, all outer loadings exceed 0.87, with some approaching 0.96, indicating that all indicators exhibit a very strong contribution to their respective constructs. The indicators X1.4 (0.957), X2.3 (0.945), Y1.1 (0.958), and Y1.3 (0.961) have the highest loadings, signifying their strong association with the constructs they represent. These findings confirm that the measurement instrument used in this study possesses excellent indicator validity.

In Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis, the Fornell-Larcker Criterion is used to assess discriminant validity by comparing the square root of the Average Variance Extracted (AVE) for each construct with the correlations between constructs. The following table demonstrates that Digital Literacy, Innovation Technology, and Knowledge Management meet this criterion, indicating that each construct has good discriminant validity and can distinctly differentiate itself from other constructs.

Table 2: Fornell-Larcker Criterion

	DIGITAL LITERACY	INNOVATION TECHNOLOGY	KNOWLEDGE MANAGEMENT
DIGITAL LITERACY	0.917		
INNOVATION TECHNOLOGY	0.677	0.948	
KNOWLEDGE MANAGEMENT	0.769	0.868	0.934

Based on the analysis using the Fornell-Larcker Criterion, the discriminant validity in this research model has met the established criteria. Discriminant validity is a crucial aspect of measurement model assessment to ensure that each construct is distinct from others. According to Fornell and Larcker (1981), discriminant validity is achieved when the square root of the Average Variance Extracted (AVE) of a construct is greater than its correlation with other constructs in the same model.

In this study, the square root of AVE for each construct is 0.917 for Digital Literacy, 0.948 for Innovation Technology, and 0.934 for Knowledge Management. When compared to the inter-construct correlations, it is evident that each square root of AVE value is higher than the correlations with other constructs, such as the correlation between Digital Literacy and

Innovation Technology (0.677) and between Innovation Technology and Knowledge Management (0.868). This finding confirms that each construct explains more variance in its own indicators than in those of other constructs in the model, thereby demonstrating strong discriminant validity.

Reliability

To ensure the quality of the measurement model, reliability and validity tests were conducted using Cronbach's Alpha, rho_A, Composite Reliability, and Average Variance Extracted (AVE).

Table 3: Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
DIGITAL LITERACY	0.953	0.956	0.964	0.841
INNOVATION TECHNOLOGY	0.943	0.945	0.964	0.898
KNOWLEDGE MANAGEMENT	0.927	0.929	0.953	0.872

Based on the results of the Construct Reliability and Validity assessment, all constructs in this study exhibit excellent reliability and validity. Construct reliability was measured using Cronbach's Alpha and Composite Reliability (CR), both of which exceeded 0.9. According to Hair et al. (2021), a Cronbach's Alpha ≥ 0.7 indicates high internal consistency, while a CR above 0.7 suggests strong reliability, ensuring that the construct consistently measures the intended variable.

Convergent validity was assessed using the Average Variance Extracted (AVE), with all variables scoring above 0.7. As per the guidelines of Hair et al. (2021) and Sarstedt et al. (2022), an AVE ≥ 0.5 indicates that a construct explains more than 50% of the variance in its indicators, confirming good convergent validity. Additionally, the rho_A values, which exceed 0.9, further reinforce the reliability assessment. According to Henseler et al. (2015), rho_A is a more accurate reliability indicator than Cronbach's Alpha in Partial Least Squares Structural Equation Modeling (PLS-SEM), as it accounts for inter-indicator correlations more flexibly.

R Square

To assess the strength of the structural model, R Square analysis is used to measure the extent to which the independent variables can explain the dependent variable. R Square indicates the proportion of variance in the Innovation Technology variable that can be explained by Digital Literacy and Knowledge Management.

Table 4: Coefficient of Determination (R Square) for the Innovation Technology Variable

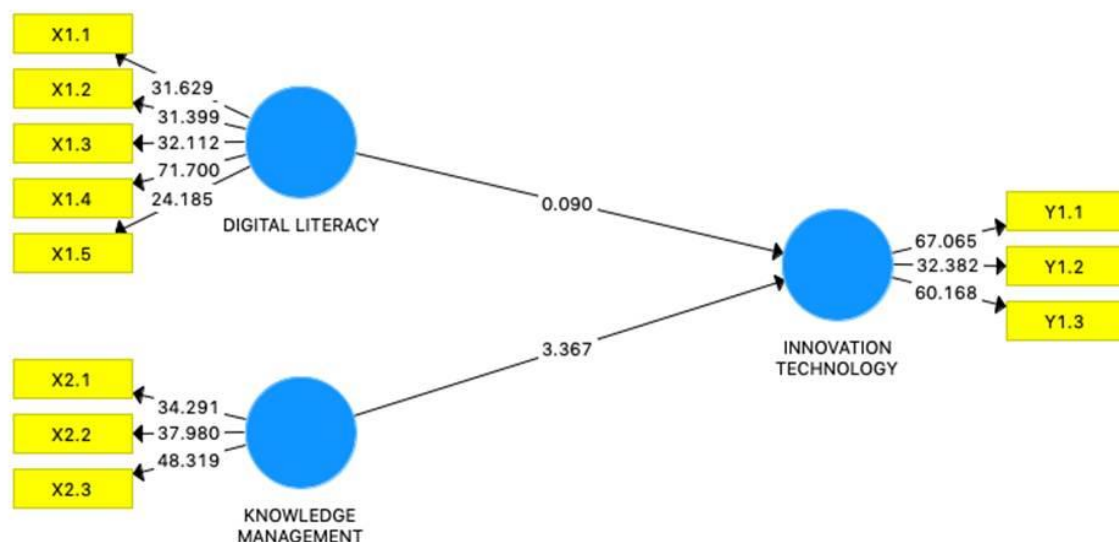
	R Square	R Square Adjusted
INNOVATION TECHNOLOGY	0.754	0.738

The R Square (R^2) value for the Innovation Technology construct is 0.754, with an Adjusted R^2 of 0.738. The R^2 value represents the proportion of variance in the dependent construct that can be explained by the independent constructs within the research model. Generally, a higher R^2 indicates a stronger predictive power of the model in explaining the variance of the dependent variable (Hair et al., 2021).

Discussion

Path analysis can explore the relationships between Digital Literacy, Knowledge Management, and Innovation Technology. This analysis aims to understand the extent to which each independent variable contributes to driving technological innovation and to identify which variable has a more dominant influence.

Figure 2: Path Results for the Influence of Digital Literacy and Knowledge Management on Innovation Technology



The results show that Digital Literacy has a path coefficient of 0.090, indicating a very small and statistically insignificant influence. This suggests that while digital literacy is essential as a foundation for supporting technology adoption, its direct impact on technology innovation remains limited without the reinforcement of other factors. Conversely, Knowledge Management demonstrates a significantly larger path coefficient of 3.367, highlighting a strong and significant effect on Innovation Technology. This finding underscores the critical role of effective knowledge management in driving technological innovation. The processes of knowledge acquisition, sharing, and utilization emerge as dominant factors that accelerate and enhance innovation.

Although digital literacy remains an essential element for ensuring access to and understanding of technology, effective knowledge management has a more substantial impact on fostering technology innovation. Therefore, strategies that integrate digital literacy enhancement with robust knowledge management systems present the most effective approach to building a sustainable innovation ecosystem, particularly among women entrepreneurs (PEKKA) who are encouraged to adapt to digital transformation.

Table 5: Bootstrapping Result

Hipotesis	T Statistics (O/STDEV)	P Values	Referensi
DIGITAL LITERACY - > INNOVATION TECHNOLOGY	0.090	0.928	Xia and Jiaqi (2024); Cetindamar et al. (2021); Ahmad et al. (2020); de Bem Machado et al. (2022)
KNOWLEDGE MANAGEMENT -> INNOVATION TECHNOLOGY	3.367	0.001	du Plessis (2007); Lai and Lin (2012); Lin et al. (2012); Mardani et al. (2018); Alegre et al. (2013); Marwick (2001); Schultze and Boland Jr (2000); Tseng (2008)

Hypothesis 1: Digital Literacy → Innovation Technology

The findings indicate that digital literacy does not have a significant impact on technology innovation (T-Statistic = 0.090, P-Value = 0.928). This suggests that while digital literacy is a fundamental aspect of technological adoption, it alone is insufficient to drive technology-based innovation in entrepreneurship education for women-headed families (PEKKA).

Prior studies, such as Xia and Jiaqi (2024) and Cetindamar et al. (2021), have emphasized that managerial and employee digital literacy contributes to digital transformation. However, its impact on innovation is contingent upon organizational readiness and supporting factors. Similarly, Ahmad et al. (2020) highlighted that workplace information literacy supports innovation, but its effectiveness largely depends on organizational support and technological resources. This is in line with findings by Judijanto and Nurrohman (2025), who assert that the effectiveness of financial technology adoption in MSMEs depends not only on digital access, but also on financial management capabilities and supporting digital ecosystems. In the context of PEKKA, although access to digital technology exists, innovation is often constrained by limited resources, inadequate digital ecosystem support, and skill gaps in leveraging technology for entrepreneurial development. Utami et al. (2024) emphasize the importance of strengthening digital literacy and infrastructure for MSMEs in the Society 5.0 era, particularly through inclusive approaches targeting vulnerable groups like PEKKA.

Certain PEKKA members require a shift in thinking prior to embracing the concept of digitalization and subsequently integrating technology into their business operations. The majority of individuals possess a minimal comprehension of digitalization. They struggle to independently generate complex marketing content or utilize digital marketing tools. As highlighted by Judijanto et al. (2024), digital economy adaptation also demands the ability to manage content creation, marketing, and digital tools—areas in which many community-based entrepreneurs still lag behind.

Furthermore, de Bem Machado et al. (2022) argued that digital transformation requires integration with knowledge management to foster sustainable innovation. This aligns with the notion that while digital literacy facilitates access to technology, without an effective knowledge management framework, technology-driven innovation in entrepreneurship

education for PEKKA cannot be fully realized. The community-based adoption process is more acceptable to members in the PEKKA community, as it occurs collectively. Members are more inclined to accept innovation due to the support of the group or community itself. This collective model resonates with the findings of Judijanto and Nurrohman (2024), who underscore the importance of environmental and social governance (ESG) principles in enabling inclusive innovation through shared community values.

Practice-based learning methods are also an important aspect of technology-based entrepreneurship education. According to Juwita, Arsyad, et al. (2024), women may find it difficult to grow their enterprises due to a lack of entrepreneurial literacy; therefore, a localized strategy is required to assist business development. Juwita, Rahayu, et al. (2024) also state that programs which provide technical coaching, business training, and business development assistance have been shown to be successful in helping PEKKA Community to improve their digital marketing and business management abilities. Thus, entrepreneurship education integrated with technology can create a learning environment that supports the development of practical skills that are relevant to market needs. This is consistent with the recommendations in Utami et al. (2024), which emphasize context-specific training and support systems as critical success factors in digital entrepreneurship for marginalized groups.

Hypothesis 2: Knowledge Management → Innovation Technology

The results demonstrate that knowledge management has a significant positive effect on technology innovation (T-Statistic = 3.367, P-Value = 0.001). This finding reinforces the argument that effective knowledge management, including knowledge sharing and technology-based knowledge utilization, enhances the capacity for technological innovation in entrepreneurship education for PEKKA. This suggests that access to digital tools alone is not sufficient for PEKKA; it is equally important for them to effectively manage and share knowledge within their entrepreneurial ecosystem. The exchange of knowledge among entrepreneurs or within the community can facilitate the more efficient application of technology. Properly managed knowledge enables PEKKA to drive innovation, improve competitiveness, and expand their business networks. Judijanto et al. (2024) highlighted that digital economy adaptation and convergence are shaped not only by access to digital tools, but also by how knowledge is structured and managed across sectors and communities, particularly in marginalized groups.

These findings are consistent with previous research, such as du Plessis (2007), which identified knowledge management as a key enabler of innovation within organizations. Similarly, Lai and Lin (2012) found that well-implemented knowledge management strategies enable firms to develop superior technological innovations. In the PEKKA context, fostering a structured system of knowledge exchange within entrepreneurial communities can facilitate technology-driven solutions that enhance business innovation among women-headed families. Judijanto and Nurrohman (2024) also stress the importance of sustainable business strategies supported by integrated knowledge systems and ESG principles, which are essential for empowering local entrepreneurship in the long term.

Moreover, Mardani et al. (2018) and Alegre et al. (2013) underscored the critical role of knowledge management in driving competitive advantage and innovation, particularly in technology-driven industries. Additionally, Marwick (2001) and Schultze and Boland Jr (2000) emphasized that knowledge management technologies accelerate innovation processes

by enhancing access to critical information and best practices. For PEKKA, a well-structured knowledge management system—incorporating digital knowledge-sharing platforms, community-based training, and mentorship programs—can empower women-headed families to effectively utilize technology for business innovation. As emphasized in Utami et al. (2024) collaborative digital programs supported by knowledge sharing and practical education frameworks can strengthen innovation capacity among MSMEs, especially for underrepresented communities.

Thus, this study confirms that technology-based innovation in entrepreneurship education for PEKKA is more strongly influenced by the effectiveness of knowledge management strategies than by digital literacy alone. These findings suggest that fostering innovation requires not only digital literacy but also a robust knowledge management system that enables woman-headed families to leverage technology effectively in their entrepreneurial endeavors. This aligns with Judijanto and Nurrohman (2025), who argue that fintech and digital transformation efforts in MSMEs should be accompanied by structured knowledge management practices to ensure sustained innovation and efficiency.

References

- Ahmad, F., Widén, G., & Huvila, I. (2020). The impact of workplace information literacy on organizational innovation: An empirical study. *International Journal of Information Management*, 51, 102041. <https://doi.org/10.1016/J.IJINFOMGT.2019.102041>
- Alegre, J., Sengupta, K., & Lapiedra, R. (2013). Knowledge management and innovation performance in a high-tech SMEs industry. *International Small Business Journal*, 31(4), 454–470.
- Anjani, N. H. (2021). *Potensi dan tantangan wirausaha perempuan dalam perekonomian Indonesia* [The Potential and Challenges of Women Entrepreneurs in the Indonesian Economy]. <https://www.cips-indonesia.org/post/opini-potensi-dan-tantangan-wirausaha-perempuan-dalam-perekonomian-indonesia?lang=id>
- Arbarini, M., Desmawati, L., Loretha, A. F., & Hardiyanti, N. (2023). Pendampingan kelompok PKK dan Pokdarwis untuk mewujudkan pemberdayaan desa ramah perempuan [Assistance for PKK and Pokdarwis groups to achieve women-friendly village empowerment]. *Dikmas: Jurnal Pendidikan Masyarakat dan Pengabdian*, 3(3), 659–668. <https://doi.org/10.37905/dikmas.3.3.659-668.2023>
- Asgharneghad, N., & Haghdoust, S. (2022). Investigating the relationship between digital literacy and knowledge management with empowerment of teachers in Dehdasht. *Management and Educational Perspective*, 3(4), 19–36.
- Asih, R. R. M. B. (2024). *Pendamping UMKM berbagi cerita: Windie Karina Farmawati, fokus pemberdayaan ekonomi perempuan* [UMKM companion shares her story: Windie Karina Farmawati, focusing on women's economic empowerment]. <https://www.prokal.co/bisnis/1774150064/pendamping-umkm-berbagi-ceritawindie-karina-farmawatifokus-pemberdayaan-ekonomi-perempuan?page=2>
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120.
- Boocock, G., Frank, R., & Warren, L. (2009). Technology-based entrepreneurship education: Meeting educational and business objectives. *The International Journal of Entrepreneurship and Innovation*, 10(1), 43–53.
- Capel, T., Vyas, D., & Brereton, M. (2017). Women in crisis situations: Empowering and supporting women through ICTs. In *Lecture Notes in Computer Science*, 10514, pp. 64–84. https://doi.org/10.1007/978-3-319-67684-5_5
- Central Bureau of Statistics. (2024). Percentage of households by province, sex of household headed and number of household members, 2009–2024. *BPS-Statistics Indonesia*. <https://www.bps.go.id/en/statistics-table/1/MTYwMyMx/percentage-of-households-by-province--sex-of-household-headed-and-number-of-household-members--2009-2024.html>

- Cetindamar, D., Abedin, B., & Shirahada, K. (2021). The role of employees in digital transformation: A preliminary study on how employees' digital literacy impacts use of digital technologies. *IEEE Transactions on Engineering Management*. Advance online publication. <https://doi.org/10.1109/TEM.2021.3079015>
- De Bem Machado, A., Secinaro, S., Calandra, D., & Lanzalonga, F. (2022). Knowledge management and digital transformation for Industry 4.0: A structured literature review. *Knowledge Management Research & Practice*, 20(2), 320–338.
- Dharmayanti, N., Fatkar, B., & Ratnasari, A. (2022). The influence of the digital economy and women's empowerment on the family economy. *Sawwa: Jurnal Studi Gender*, 17(1), 47–76. <https://doi.org/10.21580/sa.v17i1.11300>
- du Plessis, M. (2007). The role of knowledge management in innovation. *Journal of Knowledge Management*, 11(4), 20–29.
- East Kalimantan Provincial Office of Communication and Information Technology. (n.d.). *Kaltim komitmen tingkatan kapasitas perempuan kepala keluarga* [East Kalimantan Commits to Enhancing the Capacities of Women-Headed Households]. <https://diskominfo.kaltimprov.go.id/berita/kaltim-komitmen-tingkatkan-kapasitas-perempuan-kepala-keluarga>
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50. <https://doi.org/10.2307/3151312>
- Ghufron, M. A., & Mardiana, H. (2020, June). The impact of knowledge management and digital literacy to create opportunities in the 4.0 industrial revolution era. In *ICASI 2020: Proceedings of the 3rd International Conference on Advance & Scientific Innovation*, (p. 7). European Alliance for Innovation.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial least squares structural equation modeling (PLS-SEM) using R: A workbook*. Springer.
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135. <https://doi.org/10.1007/s11747-014-0403-8>
- IDN Times. (2023). Tips menjaga usaha kamu dari penipuan online [Tips to Protect Your Business from Online Fraud]. <https://www.idntimes.com/business/economy/ridwan-aji-pitoko-1/tips-menjaga-usaha-dari-penipuan-online>
- Jasin, M., Anisah, H., Fatimah, C., Azra, F., Suzanawaty, L., & Junaedi, I. (2024). The role of digital literacy and knowledge management on process innovation in SMEs. *International Journal of Data and Network Science*, 8(1), 337–344.

- Judijanto, L., & Nurrohman, R. (2025). The Influence of The Application of Financial Technology (Fintech) on Financial Management Efficiency in Micro, Small And Medium Enterprises (MSMes). *International Journal of Financial Economics*, 2(2), 426-438.
- Judijanto, L., & Nurrohman, R. (2024). *Transforming the Business World: Analysis of Sustainable Business Implementation and Environmental, Social, Governance (Esg) in Gaining Investor Trust*.
- Judijanto, L., Yusniar, Y., Nurrohman, R., Sudarmanto, E., & Supriatna, E. (2024). Bibliometric review on digital economy and industry convergence: The impact of digitalization on business adaptation and innovation. *West Science Interdisciplinary Studies*, 2(10), 1963-1974.
- Juwita, R., Arsyad, A. W., Farmawati, W. K., & Rohmah, A. N. (2024). *Pemberdayaan Perempuan Kepala Keluarga Melalui Penerapan Teknologi dan Digitalisasi Pemasaran pada Komunitas Mompreneurs* [Empowerment of Women-Headed Households Through the Implementation of Technology and Digital Marketing in Mompreneur Communities]. *Jurnal Masyarakat Mandiri (JMM)*, 8(6), 4–12. <https://journal.ummat.ac.id/index.php/jmm/article/view/27106/0>
- Juwita, R., Rahayu, D., Rohmah, A. N., & Pawae, R. D. (2024). Unlocking women's empowerment towards digital inclusivity in East Kalimantan through digital competence evaluation. *Jurnal Ilmu Sosial dan Ilmu Politik*, 27(3), 260–276. <https://doi.org/10.22146/jsp.78163>
- Karwati, L. (2017). Pemberdayaan Perempuan Melalui Pelatihan Kewirausahaan Berbasis Potensi Alam Setempat [Women's Empowerment through Entrepreneurship Training Based on Local Natural Potentials]. *JIV–Jurnal Ilmiah Visi*, 12(1), 45–52. <https://doi.org/10.21009/JIV.1201.5>
- Kerlinger, F., & Lee, H. (2000). *Foundations of behavioral research*. Harcourt College Publishers.
- Lai, Y. L., & Lin, F. J. (2012). The effects of knowledge management and technology innovation on new product development performance: An empirical study of Taiwanese machine tools industry. *Procedia - Social and Behavioral Sciences*, 40, 157–164.
- Landor, J. (2020). Mompreneurs: Economics, parenting and identity. *Travail et Emploi, (special edition)*, 121–141. <https://doi.org/10.4000/travailemloi>
- Lin, R. J., Che, R. H., & Ting, C. Y. (2012). Turning knowledge management into innovation in the high-tech industry. *Industrial Management & Data Systems*, 112(1), 42–63.
- Mardani, A., Nikoosokhan, S., Moradi, M., & Doustar, M. (2018). The relationship between knowledge management and innovation performance. *The Journal of High Technology Management Research*, 29(1), 12–26.

- Marwick, A. D. (2001). Knowledge management technology. *IBM Systems Journal*, 40(4), 814–830.
- Meungwe, C. N. (2025, January). Digital literacy and online entrepreneurship: Empowering women and youth in Cameroon. *Denis & Lenora Foretia Foundation*.
<https://www.foretiafoundation.org/digital-literacy-and-online-entrepreneurship-empowering-women-and-youth-in-cameroon/>
- Musa, S. (2024). *Digital Literacy Skills, Knowledge Management Practices And Innovative Service Delivery in University Libraries in North - West, Nigeria*.
<https://kubanni.abu.edu.ng/handle/123456789/13030>
- North Kalimantan Provincial Government. (2022). *Kunjungi BPS RI, Gubernur paparkan lima tantangan membangun Kaltara* [During Visit to BPS RI, Governor Outlines Five Challenges in Developing North Kalimantan].
<https://pusaranmedia.com/read/11166/kunjungi-bps-ri-gubernur-paparkan-lima-tantangan-membangun-kaltara>
- Paramitha, Y. W. (2023). *The dilemma of female heads of families in Indonesia*. Kompas.id.
<https://www.kompas.id/baca/english/2023/12/21/en-dilema-perempuan-kepala-keluarga-di-indonesia>
- Portal Informasi Indonesia. (2024). *Indonesia di jalan menuju SDGs 2030: Tantangan dan komitmen pembangunan berkelanjutan* [Indonesia on the Road to SDGs 2030: Challenges and Commitments to Sustainable Development].
<https://indonesia.go.id/kategori/editorial/8618/indonesia-di-jalan-menuju-sdgs-2030->
- PRAKARSA. (2020). *Economic empowerment for women-led MSMEs in rural Indonesia: Lessons from Indonesian CSOs*.
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.
- Samarinda Municipal Department of Women Empowerment and Child Protection. (2024). *Laporan SKM Semester 1 UPTD PPA Kota Samarinda Tahun 2024* [Semester 1 Public Satisfaction Survey (SKM) Report of UPTD PPA Samarinda City, 20024].
<https://dp2pasamarinda.com/?p=965>
- Sarstedt, M., Hair, J. F., Pick, M., Liengaard, B. D., Radomir, L., & Ringle, C. M. (2022). Progress in partial least squares structural equation modeling use in marketing research in the last decade. *Psychology & Marketing*, 39(5), 1035–1064.
<https://doi.org/10.1002/mar.21640>
- Schultze, U., & Boland Jr., R. J. (2000). Knowledge management technology and the reproduction of knowledge work practices. *The Journal of Strategic Information Systems*, 9(2–3), 193–212.

- Secretariat of the Samarinda City Government. (2024). *Pemberdayaan Perempuan Kepala Keluarga Dibekali Melalui Pengembangan Soft Skill UMKM* [Empowering Women-Headed Households through MSME Soft Skills Development]. <https://jdih.samarindakota.go.id/jdih/umum/pemberdayaan-perempuan-kepala-keluarga-dibekali-melalui-pengembangan-soft-skill-umkm>
- Shabira, I. (2024). *Di Papua, lebih dari 90% perempuan jadi kepala rumah tangga* [In Papua, More Than 90% of Women Are Heads of Households]. GoodStats.id. <https://goodstats.id/article/di-papua-lebih-dari-90-perempuan-jadi-kepala-rumah-tangga-9l3xE>
- Silamut, A. A., & Petsangsri, S. (2020). Self-directed learning with knowledge management model to enhance digital literacy abilities. *Education and Information*.
- Susiana, S. (2024). National financial inclusion strategy for women's economic empowerment. *INFO Singkat: Field of People's Welfare—A Brief Study of Actual and Strategic Issues*, 16(5). https://berkas.dpr.go.id/pusaka/files/info_singkat/Info%20Singkat-XVI-5-I-P3DI-Maret-2024-177-EN.pdf
- Tseng, S. M. (2008). The effects of information technology on knowledge management systems. *Expert Systems with Applications*, 35(1–2), 150–160.
- Utami, T., Purnomo, B., Estiana, R., Padilah, H., Harto, B., Judijanto, L., Munizu, M., Adrian, A., Ratnaningrum, L. P. R. A., & Nurrohman, R. (2024). *UMKM DIGITAL: Teori dan Implementasi UMKM pada Era Society 5.0* [Theory and Implementation of MSMEs in the Era of Society 5.0]. PT. Sonpedia Publishing Indonesia.
- Wang, X., & Wu, J. (2024). Managers' digital literacy and corporate green technology innovation. *Frontiers of Business Research in China*, 18(3), 214. <https://doi.org/10.3868/s070-009-024-0011-0>
- Widi, S. (2023). *Ada 12,72% kepala rumah tangga perempuan di Indonesia pada 2022* [In 2022, 12.72% of households in Indonesia were headed by women]. <https://dataindonesia.id/varia/detail/ada-1272-kepala-rumah-tangga-perempuan-di-indonesia-pada-2022>
- Xia, W., & Jiaqi, W. (2024). Managers' digital literacy and corporate green technology innovation. *Frontiers of Business Research in China*, 18(3).